

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO.

WAIVING WASTE DISCHARGE REQUIREMENTS
FOR
CITY OF ROSEVILLE
DIAMOND CREEK WELL
PHASE II DEMONSTRATION AQUIFER STORAGE AND RECOVERY PROJECT
PLACER COUNTY

WHEREAS, the California Regional Water Quality Control Board, Central Valley Region, (hereinafter Regional Board) finds that:

1. Water Code Section 13260(a) requires that any person discharging wastes or proposing to discharge wastes within the region that could affect the quality of waters of the State shall file a Report of Waste Discharge; and
2. The City of Roseville (City) submitted a complete Report of Waste Discharge, including a \$6,235 filing fee, for its Phase II demonstration aquifer storage and recovery (ASR) project on 16 May 2005; and
3. The ASR demonstration project will be used to evaluate opportunities to store treated water from the City of Roseville's Water Treatment Plant (WTP) in the groundwater basin underlying Placer County by direct injection during the "wet" years with subsequent extraction to supplement the City's surface water supply during "dry" years; and

Phase I Results

4. The City completed the Phase I ASR demonstration project under Resolution No. R5-2003-0083 in December 2004. The Phase I project consisted of 26 days of injection at approximately 1,350 gallons per minute (gpm), and approximately 29 days of extraction at approximately 3,400 gpm; and
5. The total volume of water injected during the Phase I ASR demonstration project was approximately 158 acre-feet, and the total amount extracted was 439 acre-feet or approximately 278 percent of what was injected; and
6. After completion of the City's Phase I ASR demonstration project, only three constituents remained in groundwater at concentrations slightly higher than baseline conditions. Those constituents included chloroform at 1.5 micrograms per liter ($\mu\text{g/L}$), dissolved fluoride at 0.2 milligrams per liter (mg/L), and dissolved organic carbon at 2.3 mg/L; and

Injection and Monitoring Wells

7. The Phase II ASR demonstration project will be conducted using the Diamond Creek Well (DCW) located in a park setting, adjacent to the Diamond Creek Elementary School near the

intersection of Northgate Drive and Big Bear Drive in Roseville, as shown on Attachment A which attached hereto and made part of this Resolution by reference; and

8. Treated water will enter the drinking water distribution system at the City's WTP and will be conveyed approximately 13.2 miles to the DCW, and

9. The DCW consists of a 20-inch diameter casing screened from 310 to 450 feet below ground surface (bgs), and monitoring of the injection/extraction activities at the DCW will be completed using three 4-inch diameter groundwater monitoring wells that are screened within the same water bearing zone as the DCW; and

10. The water bearing zone consists primarily of gravelly sand and sandy gravel of the Mehrten formation; and

11. The City has installed the three groundwater monitoring wells (DCMW-1, DCMW-2, and DCMW-3) to measure the effect of the injection and extraction on the underlying groundwater; and

12. The DCMW-1 is 117 feet southeast of the DCW, DCMW-2 is 196 feet northeast of the DCW, and DCMW-3 is 1,417 feet southwest of the DCW, as shown on Attachment B, which is attached hereto and made part of this Resolution by reference; and

Injected Water Quality

13. The source of the water injected into the aquifer will be treated surface water from Folsom Lake which is sent to the City's WTP for conventional treatment including coagulation/flocculation, upflow clarification, gravity filtration through dual media filters, chlorine disinfection, fluoridation, pH adjustment for chlorine control; and

14. The chemicals used in the treatment of the source water include: (a) aluminum sulfate, used for primary coagulation; (b) chlorine, used for primary disinfection, pre-chlorination, and periodic chlorination of filters; (c) lime, used for corrosion control through pH/alkalinity adjustments; and (d) hydrofluosilicic acid polymer, used as a coagulant and fluoride additive; and

15. The quality of the treated water injected into the aquifer will meet Department of Health Services (DHS) drinking water standards for all constituents; and

16. Baseline water samples were collected from the City's WTP and the DCW in May 2004, prior to the Phase I ASR demonstration program, and in May 2005. Analytical results are presented below with limits applying their applicable water quality objectives for protection of the beneficial uses of the underlying groundwater:

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-3-

Constituent	Units	WTP Injection Water Sample	DCW Baseline Groundwater Sample	Ground Water Quality Limit
pH	std.	7.3 – 8.9	6.5 – 7.3	6.5 to 8.4
Dissolved Organic Carbon	mg/L	0.9 – 1.9	<0.1– 0.3	None
Total Kjeldahl Nitrogen	mg/L	<0.1	<0.1	None
Total Alkalinity	mg/L	24 – 34	59 –61	None
Total Dissolved Solids	mg/L	47 - 61	430 – 470	450
Chlorine Residual	mg/L	0.36 – 0.9	<0.05	0.002
Aluminum, dissolved	µg/L	21 - 32	<10	200
Ammonia, dissolved	µg/L	<10	<10	1,500
Antimony, dissolved	µg/L	<0.5	<0.5	6
Arsenic, dissolved	µg/L	<0.5	1.8 – 2.5	0.004
Barium, dissolved	µg/L	15	79 – 91	1,000
Beryllium, dissolved	µg/L	<1.0	<1.0	1.0
Boron, dissolved	µg/L	<100	700 – 730	700
Bromide, dissolved	µg/L	<10	330 – 1,800	2,300
Cadmium, dissolved	µg/L	<0.1	<0.1	0.07
Calcium, dissolved	µg/L	9,000 – 10,000	31,000 – 36,000	None
Chloride, dissolved	µg/L	3,800 - 4,000	150,000 – 170,000	106,000
Chromium, dissolved	µg/L	<5.0	5.8 – 8.2	50
Cobalt, dissolved	µg/L	<2.0	<2.0	50
Copper, dissolved	µg/L	<5	<5	170
Fluoride, dissolved	µg/L	300 – 1,100	<100 – 510	1,000
Iron, dissolved	µg/L	<5.0 - 120	<5.0 – 100	300
Lead, dissolved	µg/L	0.5 – 0.68	<0.25	2
Magnesium, dissolved	µg/L	2,000 - 2,200	15,000 – 18,000	None
Manganese, dissolved	µg/L	<5.0-30.0	<5.0	50
Mercury, dissolved	µg/L	<0.2	<0.2	1.2
Molybdenum, dissolved	µg/L	<5.0	<5.0	10
Nickel, dissolved	µg/L	1.6 – 2.0	4.0 – 4.7	12
Nitrate as N, dissolved	µg/L	<100 – 300	1,200 – 5,900	10,000
Nitrite as N, dissolved	µg/L	<30	<30	1,000
Phosphate, dissolved	µg/L	<100	<100	None
Potassium, dissolved	µg/L	500 – 600	2,100 – 3,100	None
Selenium, dissolved	µg/L	<2.0	<2.0	20
Silica, dissolved	µg/L	9,600 – 12,000	63,000 – 74,000	None
Silver, dissolved	µg/L	<3.0	<3.0	35
Sodium, dissolved	µg/L	4,000 - 4,300	71,000 – 85,000	20,000
Sulfate, dissolved	µg/L	6,000 – 13,000	25,000 – 27,000	250,000

Constituent	Units	WTP Injection Water Sample	DCW Baseline Groundwater Sample	Ground Water Quality Limit
Sulfite, dissolved	µg/L	<500	<500	None
Thallium, dissolved	µg/L	<0.1	<0.1	0.1
Tin, dissolved	µg/L	<1.0	<1.0	None
Vanadium, dissolved	µg/L	<2.0	18	50
Zinc, dissolved	µg/L	<20	<20	2,000
Total Coliform Organisms	MPN/100 mL	<2.0	<2.0	<2.2
Total THMs	µg/L	36.2 – 50.9	<1.0 – 16.4	80
Chloroform	µg/L	34– 43	0.5 – 5.4	1.1
Bromoform	µg/L	<0.5	<0.5	4
Bromodichloromethane	µg/L	2.2 – 3.1	<0.5	0.27
Dibromochloromethane	µg/L	<0.5	<0.5	0.37
Fluorobenzene	µg/L	9.9 – 10.5	8.2 – 11	None
Total HAAs	µg/L	20.9 – 23.7	<1.0	60
Dichloroacetic acid	µg/L	4.7 - 8.9	<1.0	0.7
Trichloroacetic acid	µg/L	12 – 17	<1.0	20
Dibromoacetic acid	µg/L	<1.0	<1.0	None
Bromoacetic acid	µg/L	<1.0	<1.0	None
Chloroacetic acid	µg/L	<1.0	<1.0	30
N-Nitrosodimethylamine (NDMA)	µg/L	<5.0	<5.0	0.0022
Volatile Organic Compounds ¹	µg/L	ND	ND	
Semi-Volatile Organics ¹	µg/L	ND	ND	
Organophosphorous Pesticides ¹	µg/L	ND	ND	

¹ Individual constituents of Volatile Organic Compounds, Semi-Volatile Organics, and Organophosphorous Pesticides were not detected above their respective detection limits. Water quality limits for these constituents are not shown.

17. These baseline data presented above indicate that fluoride, chlorine residual, chloroform, bromodichloromethane and dichloroacetic acid exceed water quality limits in samples collected from the WTP. In addition, the City's analytical quantitation limits for dibromochloromethane and NDMA's were higher than the their respective water quality limits; and

Injection, Storage and Recovery (ISR) Cycles

18. The Phase II ASR demonstration project will include: (a) one month of baseline data collection, (b) injecting a total of 1,094 acre-feet (3.56×10^8 gallons) of water at a rate of 1,375 gallons per minute (gpm) for six months, (c) storage of the injected water in the aquifer for four months, (d) a ten month extraction phase at 2,500 gpm recovering 3,314 acre-feet (1.08×10^9 gallons) of water, and (e) two months of post testing; and

19. Based on data collected from the 96-day Phase I ASR demonstration test which consisted of 26 days of injection and three extraction phases totaling 29 days, the City has developed a numerical model to estimate the anticipated injection front and capture zones for ISR cycles; and

20. The particle tracking analysis results from the groundwater modeling suggests that the aquifer storage zone created by the injection of drinking water is expected to travel approximately 550 feet upgradient and 829 feet downgradient from the DCW as shown on Attachment B; and

21. The City's numerical model predicts that approximately 300 percent withdrawal of the volume of the total water injected into the aquifer storage zone will be recovered, ensuring that there is not a threat to water quality at the conclusion of the ISR cycles; and

22. The numerical model suggests that the three existing monitoring wells are adequate to monitor groundwater quality impacts from the Phase II ASR demonstration program; and

23. The water extracted during the recovery cycle will be beneficially used in the City's drinking water distribution system, as approved by DHS; and

24. Water samples will be collected during each cycle to monitor hydrologic conditions, as well as the quality of water injected into the aquifer and changes in groundwater quality; and

25. The monitoring strategy is flexible and is initially intended to identify constituents of concern for continued monitoring activities. Based on the results of initial monitoring, and as appropriate, a reduced sampling schedule and/or list of monitored constituents may be implemented through a revised Monitoring and Reporting Program issued by the Executive Officer without the need to bring it back to the Board, and

Regulatory Considerations

26. The City prepared an Initial Study/Mitigated Negative Declaration for the Diamond Creek Well Phase II Demonstration ASR Project which was adopted at a city council hearing on 3 August 2005; and

27. Injected water quality, including disinfection by-products, is a concern for protection of all beneficial uses when the constituent concentrations exceed water quality objectives for groundwater; and

28. No active or abandoned industrial, agricultural, or domestic wells exist within the aquifer storage zone of the DCW or within an additional 1,000 foot radius; and

29. The City has established institutional controls to ensure that no other users of the aquifer storage zone exist now or in the future. These controls include well permitting requirements as outlined in the City's Well Water Code. The requirements are overseen by the City's Environmental Utilities Engineering Division, which is the same division that is managing the Phase II ASR project; and

30. The water within the aquifer storage zone must meet DHS drinking water standards to be beneficially used in the City's drinking water distribution system; and

31. The Regional Board has a statutory obligation to prescribe waste discharge requirements, but pursuant to Water Code section 13269, may waive waste discharge requirements if it determines, after any necessary meeting, that the waiver is consistent with any applicable state or regional water quality control plan and is in the public interest; and

32. Consistent with Water Code section 13269, any waiver may not exceed five years duration, must be conditional, may be terminated by at any time by the state board or regional board, and must include monitoring, unless waived; and

33. Based on the following considerations, the Regional Board determines that this Waiver is in the public interest:

- a. A serious need exists for communities within the State of California to supplement their water supplies; and
- b. Both the California Bay-Delta Authority and the California Department of Water Resources recommend ASR technology for supplementing water supplies where agencies can conjunctively use both surface water and groundwater supplies; and
- c. The Regional Board has determined that the injection of drinking water for future extraction is not a discharge of waste due to the limited nature, extent and duration of the above-described discharge and the preclusion of other uses and users; and
- d. The groundwater outside the limits of the aquifer storage zone (a) may have other users/uses now or in the future, and (b) must meet all applicable water quality objectives; and

- e. If in the future the City proposes to conduct a full-scale ASR project, an appropriate filing fee and a RWD must be submitted to the Regional Board. At a minimum, the RWD must provide: (a) a description of the project, including the extent of the portion of the aquifer storage zone that may exceed water quality objectives (a.k.a. the “bubble”), (b) a completed well survey, (c) documentation that institutional controls are in place to ensure that no other users of the bubble exist, (d) a full-scale monitoring program, (e) a sampling and analysis plan, (f) well construction details for all injection/extraction and monitoring wells, (g) a contingency plan detailing measures to be implemented to ensure water quality objectives are met beyond the bubble and that DHS drinking water source requirements are met within the bubble, and (h) an adopted CEQA document; and
 - f. Monitoring of the demonstration study is necessary to obtain technical data sufficient to assess potential long-term water quality impacts and the need for mitigation measures associated with more extensive testing or a full-scale project, including an analysis of whether the City must implement Best Practicable Treatment Control (BPTC) measures to reduce the concentrations of disinfection byproducts or other constituents of concern in the water injected into the groundwater; and
 - g. The City must conduct sufficient monitoring during the demonstration study to assess whether a full-scale ASR project would comply with the Antidegradation Policy and demonstrate that dilution and/or degradation will reduce the concentrations of any constituents of concern to below applicable water quality objectives outside the bubble; and
34. Based on the following considerations, the Regional Board determines that this Waiver is consistent with applicable water quality control plans:
- a. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Board; and
 - b. The designated beneficial uses of the groundwater in the vicinity of the City’s ASR Project are municipal and domestic supply, agricultural supply, industrial service supply, and industrial process supply; and
 - c. The Basin Plan contains several narrative water quality objectives that apply to groundwater in the vicinity of the City’s ASR project; and
 - d. The Chemical Constituents objective requires that chemical constituents shall not be present in concentrations that adversely affect beneficial uses and shall not exceed maximum contaminant levels (MCLs) adopted by DHS; and

- e. The Toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial uses; and
- f. The Tastes and Odors objective requires that groundwater shall not contain taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses; and
- g. Chapter IV of the Basin Plan contains the *Policy for Application of Water Quality Objectives*, which provides that “[w]here compliance with narrative objectives is required (i.e., where the objectives are applicable to protect specified beneficial uses), the Regional Water Board will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives”; and provides that to evaluate compliance with narrative water quality objectives the Regional Board considers, among other things, “relevant numerical criteria and guidelines developed and/or published by other agencies and organizations”; and
- h. The following are appropriate water quality limits for trihalomethanes, haloacetic acids, and other disinfection byproducts to apply applicable water quality objectives for groundwater:

<u>Constituent</u>	<u>Water Quality Limit, ug/l</u>	<u>Reference</u>
Chlorine residual	2	Odor Threshold
Total THMs	80	US EPA Primary MCL
Chloroform	1.1	Cal/EPA Cancer Potency Factor
Bromoform	4	US EPA IRIS Cancer Risk Level
Bromodichloromethane	0.27	Cal/EPA Cancer Potency Factor
Dibromochloromethane	0.37	Cal/EPA Cancer Potency Factor
Total HAAs	60	US EPA Primary MCL
Dichloroacetic acid	0.7	US EPA IRIS Cancer Risk Level
Trichloroacetic acid	20	US EPA Health Advisory
Chloroacetic acid	30	US EPA Health Advisory
NDMA	0.0022	Cal/EPA Cancer Potency Factor

- i. If at the end of all ISR cycles, constituents of concern remain above applicable water quality objectives or if at any time groundwater exceeds any DHS drinking water standard, then the City will implement its Contingency Plan that was submitted as part of the RWD; and
- j. The City’s Contingency Plan states that if any of the water quality samples collected and analyzed at the end of the extraction period identify constituents remaining in the

aquifer above their applicable water quality objectives, additional extraction will be performed until the monitoring data confirms that these chemical constituents are at concentrations below their respective water quality objectives; and

35. At its meeting on [date], the Regional Board considered all comments concerning this matter:

THEREFORE BE IT RESOLVED, in accordance with California Water Code section 13269, that the California Regional Water Quality Control Board, Central Valley Region, waives waste discharge requirements for the City of Roseville Phase II Demonstration Aquifer Storage and Recovery Program, subject to the following conditions:

1. The discharge of water shall not create a condition of pollution or nuisance (as defined in Section 13050, California Water Code) beyond the aquifer storage zone identified in Attachment B; and
2. Any condition of pollution or nuisance (as defined in Section 13050, California Water Code), including violation of any water quality objective created during injection, storage, and recovery shall not remain in the aquifer at the conclusion of the ISR cycles; and
3. Due to the benefit of the increased water supply by the public entity, some groundwater degradation at the end of the Phase II ASR demonstration program may be allowed only if those concentrations are less than water quality objectives; and
4. Only treated water from the City's WTP shall be injected into the ASR well at an average flow rate not to exceed 1,375 gpm and a total volume for a 6-month period not to exceed 1,094 acre-feet (3.56×10^8 gallons); and
5. During the recovery cycle, the Discharger shall extract a minimum of 300 percent of the volume of water injected during that same cycle as proposed in the RWD; and
6. Prior to implementing the Phase II ASR demonstration program, the Discharger shall obtain from DHS written approval for discharge of extracted water to the drinking water distribution system, and shall submit a copy of that approval to the Regional Board; and
7. The City shall operate and maintain the ASR groundwater monitoring wells, and shall evaluate the potential for groundwater degradation and the need to reduce the levels of THMs, HAAs, other disinfection byproducts, or other constituents of concern in treated source water due to this activity in compliance with the attached Monitoring and Reporting Program (MRP) (Attachment C), which is attached hereto and made part of this Resolution by reference; and
8. Water quality samples shall be collected and analyzed during the testing cycles in accordance with the MRP (Attachment C); and

9. If THMs, HAAs, other disinfection byproducts, or other constituents of concern are detected at levels exceeding applicable water quality objectives (a) beyond the City's anticipated injection front during the testing, or (b) in the aquifer at the conclusion of the recovery phase of testing, then the City shall notify the Regional Board within 24 hours of becoming aware of the detection, and shall immediately implement its Contingency Plan; and
10. The City shall submit the monitoring reports to the Regional Board as described in the MRP, Attachment C; and
11. This Resolution expires within **120 days** following completion of the post-testing phase of the Phase II ASR demonstration project and shall have a term of no longer than five years from the date of adoption.

BE IT FURTHER RESOLVED that this Waiver of waste discharge requirements is conditional and may be terminated at any time.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a true, full, and correct copy of a resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on _____.

THOMAS R. PINKOS, Executive Officer